US005509716A

United States Patent [19]

Kolena et al.

[11] Patent Number: 5,509,716

[45] Date of Patent: Apr. 23, 1996

[54] VEHICLE SEAT WITH PERIMETER FRAME AND PELVIC CATCHER

[75] Inventors: David P. Kolena, Bloomfield Hills; Paul A. Glinski, Chesterfield; Robert S. Crane, Waterford; Mladen Humer, Eastpointe; David C. Viano, Bloomfield Hills; Richard J. Neely, Casco, all of Mich.

[73] Assignee: General Motors Corporation, Detroit, Mich.

[21] Appl. No.: 335,591

[22] Filed: Nov. 8, 1994

[51] Int. Cl.[6] B60R 21/00

[52] U.S. Cl. 297/216.13; 297/452.18; 297/216.1

[58] Field of Search 297/216.1, 216.13, 297/216.14, 452.18, 452.2, 354.12, 452.53, 452.52

[56] References Cited

U.S. PATENT DOCUMENTS

1,598,468	8/1926	Whall .	
1,684,062	9/1928	Leach et al. .	
2,833,339	5/1958	Liljengren	155/179
3,545,808	12/1970	Geschcidle	297/216
3,586,376	6/1971	Le Mire	297/452.2
4,076,306	2/1978	Satzinger	297/216
4,192,545	3/1980	Higuchi et al.	297/216
4,249,769	2/1981	Barecki	296/65 A
4,512,604	4/1985	Maeda et al.	296/65 A
4,519,650	5/1985	Tanda et al.	297/452
4,526,423	7/1985	Meinershagen et al.	297/440
4,695,097	9/1987	Murnishi	297/452
4,796,954	1/1989	Saito	297/452.2
4,938,527	7/1990	Schmale et al.	297/216
5,044,693	9/1991	Yokota	297/452
5,054,845	10/1991	Vogel	297/216
5,123,706	6/1992	Granzow et al.	297/452
5,129,707	7/1992	Yamauchi	297/460
5,290,089	3/1994	Oleszko et al.	297/216.14
5,310,247	5/1994	Fujimori et al.	297/378.12
5,318,341	6/1994	Griswold et al.	297/362.11
5,328,248	7/1994	Nishiyama	297/452.56

FOREIGN PATENT DOCUMENTS

1130717	5/1962	Germany .	
3010662	9/1981	Germany	297/216.14
1011411A	4/1983	U.S.S.R. .	

Primary Examiner—Milton Nelson, Jr.
Attorney, Agent, or Firm—Ernest E. Helms

[57] ABSTRACT

A vehicle seat is providing including a seat bottom frame; a generally U-shaped seat back frame with an upper cross member with legs pivotally mounted with respect to the seat bottom frame, the seat back cross member being generally at least approximately 470 millimeters along a line generally parallel to the torso of a seated occupant from an H point of the seated occupant, and the cross member being concavely bowed if under approximately 525 millimeters from the H point of the seated occupant; and a deformable lower cross member having ends fixably connected to the seat back legs being concavely bowed, the cross member having a major dimension oriented generally parallel to the torso of the seated occupant, the lower cross member having an upper end and a lower end, the lower cross member upper end being vertically above the H point of a seated occupant when the seat back frame is positioned in a normal seating position and where in a rear crash situation, the lower cross member deforms to pivot its lower end further away from the seat back frame legs than its top end to capture the seated occupant's pelvic region between the lower cross member and the bottom frame.

6 Claims, 2 Drawing Sheets

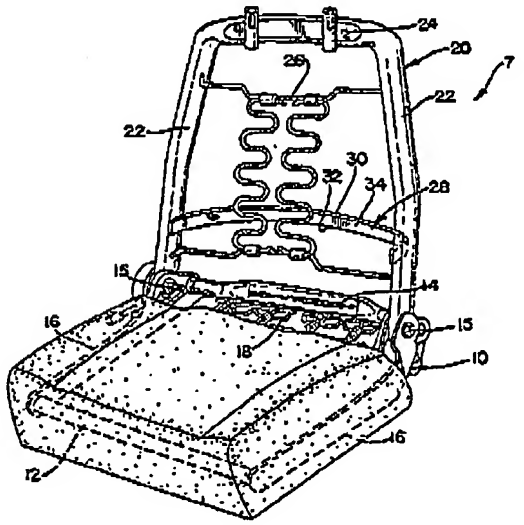


Exhibit 2

US005568961A

United States Patent [19]

Colasanti

[11] Patent Number: 5,568,961

[45] Date of Patent: Oct. 29, 1996

[54] **TUBULAR SEAT FRAME**

[75] Inventor: Ardnino Colasanti, Eastpointe, Mich.

[73] Assignee: Findlay Industries, Troy, Mich.

[21] Appl. No.: 288,450

[22] Filed: Aug. 10, 1994

[51] Int. Cl.[6] B60N 2/02

[52] U.S. Cl. 297/362.12; 297/452.2; 297/362.13; 297/354.1

[58] Field of Search 297/362.12, 354.1, 297/362.13, 452.18, 452.2, 463.1

[56] References Cited

U.S. PATENT DOCUMENTS

3,037,812	6/1962	Monroe	297/362.13
3,140,896	5/1963	Babbs .	
4,111,482	9/1978	Jones .	
4,291,914	9/1981	Mizelle .	
4,400,032	8/1983	Depolo .	
4,575,153	3/1986	Aoki et al.	297/452.2
4,632,452	12/1986	Vogel .	
4,707,010	11/1987	Croft et al. .	
4,709,963	12/1987	Uecker et al. .	
4,804,225	2/1989	Pountey et al.	297/452.2
4,828,278	9/1989	Nakao et al. .	
4,919,486	4/1990	Chinomi et al. .	
4,993,778	2/1991	Colin et al. .	
5,050,932	9/1991	Pipm et al.	297/452.18 X
5,104,189	4/1992	Hanai et al. .	
5,104,190	4/1992	Siegrist	297/354.1 X
5,165,756	11/1992	Baker et al. .	

FOREIGN PATENT DOCUMENTS

2693889	1/1994	France	297/362.13

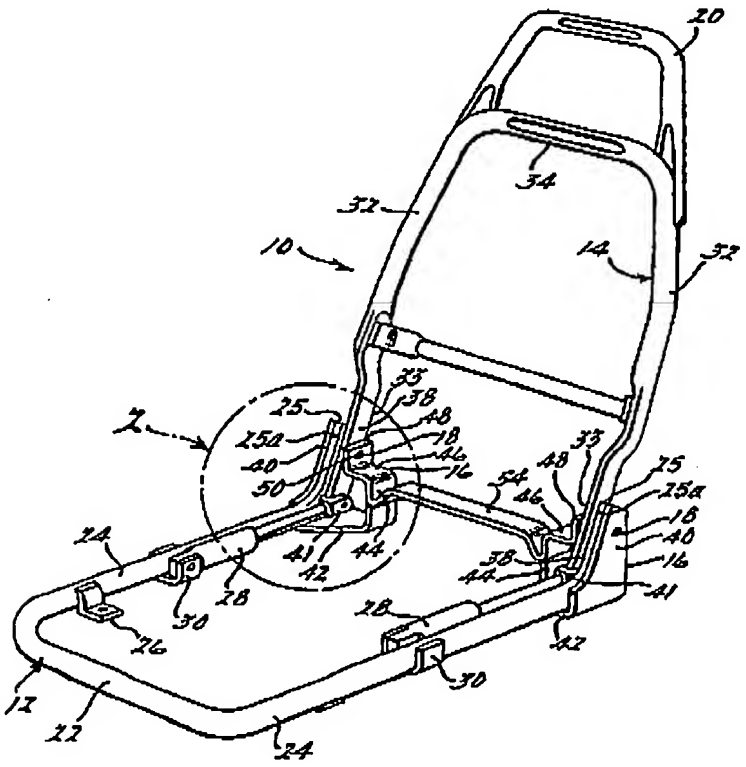
Primary Examiner—Laurie K. Cranmer

Attorney, Agent, or Firm—Dinnin & Dunn, P.C.

[57] **ABSTRACT**

The device is a tubular seat frame for use in a vehicle application. The seat frame including a generally U-shaped seat base frame connected to a bracket member and a generally U-shaped seat back frame pivotally connected to the seat base frame through the bracket member for variable positioning by means of an adjustment means attached to the lower end of the seat back frame. The bracket member provides an extra wall at the pivot point to further support and retain the seat back frame. The bracket member providing a design for a lightweight seat frame which reduces overall weight while at the same time retaining its strength integrity.

7 Claims, 2 Drawing Sheets



US005636901A

United States Patent [19]

Grilliot et al.

[11] Patent Number: 5,636,901

[45] Date of Patent: Jun. 10, 1997

[54] AIRCRAFT PASSENGER SEAT FRAME

[75] Inventors: Ronald Grilliot, Plantation; Patrick Murphy, Miami, both of Fla.

[73] Assignee: Aircraft Modular Products, Inc., Miami, Fla.

[21] Appl. No.: 490,791

[22] Filed: Jun. 15, 1995

[51] Int. Cl.[6] A47C 7/02

[52] U.S. Cl. 297/452.18; 297/452.2; 297/452.55; 297/216.1; 297/362.13; 248/188.1

[58] Field of Search 297/452.18, 452.2, 297/362.13, 216.1, 216.3, 243, 248, 452.55; 248/440.1, 188.1

[56] References Cited

U.S. PATENT DOCUMENTS

3,744,844	7/1973	Nomald et al.	297/362.13
3,785,600	1/1974	Padovano	248/188.1
3,807,796	4/1974	Winges	297/362.13
3,893,729	7/1975	Sherman et al.	248/188.1 X
4,229,040	10/1980	Howell et al.	297/248 X
4,372,608	2/1983	Hotta	297/362.13
4,375,300	3/1983	Long et al.	248/188.1 X
4,489,978	12/1984	Brennan	248/188.1
4,630,864	12/1986	Toll	297/216.1 X
4,761,036	8/1988	Vogel	297/452.18
5,029,942	7/1991	Rink	297/452.18
5,224,755	7/1993	Berath	297/216.1 X
5,310,247	5/1994	Fujimori et al.	297/452.18 X
5,318,341	6/1994	Griswold et al.	297/452.18 X
5,382,083	1/1995	Fectau et al.	297/452.2
5,447,360	9/1995	Hewko et al.	297/452.18
5,452,941	9/1995	Halse et al.	297/452.2 X
5,485,976	1/1996	Creed et al.	297/452.55 X
5,501,509	3/1996	Uruttia	297/452.18
5,553,923	9/1996	Bilezikjian	297/452.2

FOREIGN PATENT DOCUMENTS

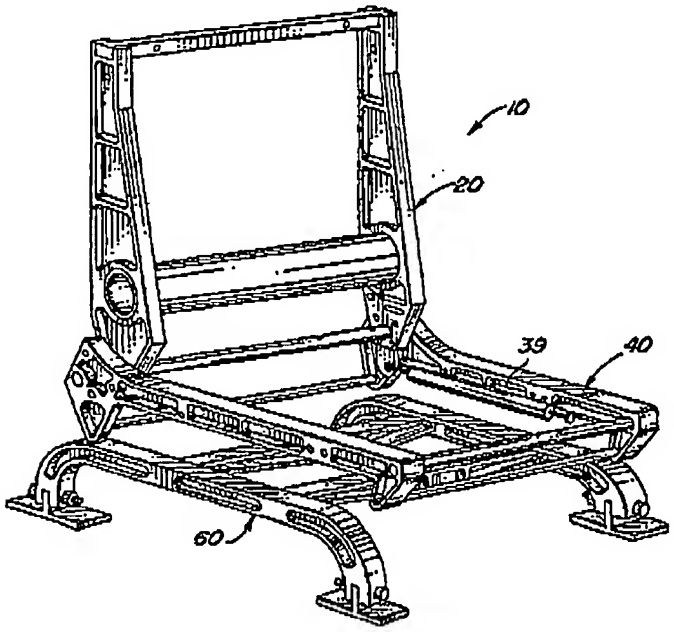
3010662	9/1981	Germany	297/452.18
4160465	12/1979	Japan	297/452.18
2126476	3/1984	United Kingdom	297/452.18

Primary Examiner—Peter M. Cuomo
Assistant Examiner—Rodney B. White
Attorney, Agent, or Firm—Malloy & Malloy, P.A.

[57] ABSTRACT

An aircraft seat frame including a seat back portion, a seat foundation portion, and a seat base portion, the seat back portion having a pair of generally vertically disposed side rails composed of three interconnected segments, a leading and a trailing edge segments of which are perpendicularly disposed on opposing sides of an interior segment, thereby substantially minimizing an overall weight of the side rails and maximizing the side rails resistance to horizontal bending across a plane of the leading and trailing segments. Further, the seat frame includes a load transference member spanning the side rails so as to evenly distribute a load exerted on only a single of the side rails over both side rails and over the corresponding seat side rails to which the seat back side rails are connected. Further, the frame includes a seat base portion having a pair of seat side rails with support members pivotally secured at opposite ends thereof, the support members being fixedly secured to an underlying support surface.

15 Claims, 2 Drawing Sheets



US005749135A

United States Patent [19]

Crane et al.

[11] Patent Number: 5,749,135

[45] Date of Patent: May 12, 1998

[54] METHOD FOR EXTRUDING INTEGRAL SEAT BACK FRAME

[75] Inventors: Robert Scott Crane, Waterford; David Philip Kolena, Bloomfield Hills; Alan Dean Berg, North Washington, all of Mich.

[73] Assignee: General Motors Corporation, Detroit, Mich.

[21] Appl. No.: 820,598

[22] Filed: Mar. 19, 1997

[51] Int. Cl.[6] B23P 17/00

[52] U.S. Cl. 29/415; 29/417; 297/452.2; 72/254; 72/256; 72/369; 72/370

[58] Field of Search 29/897.2, 415, 29/417; 297/452.18, 452.19, 452.2; 72/254, 256, 367, 368, 369, 370

[56] References Cited

U.S. PATENT DOCUMENTS

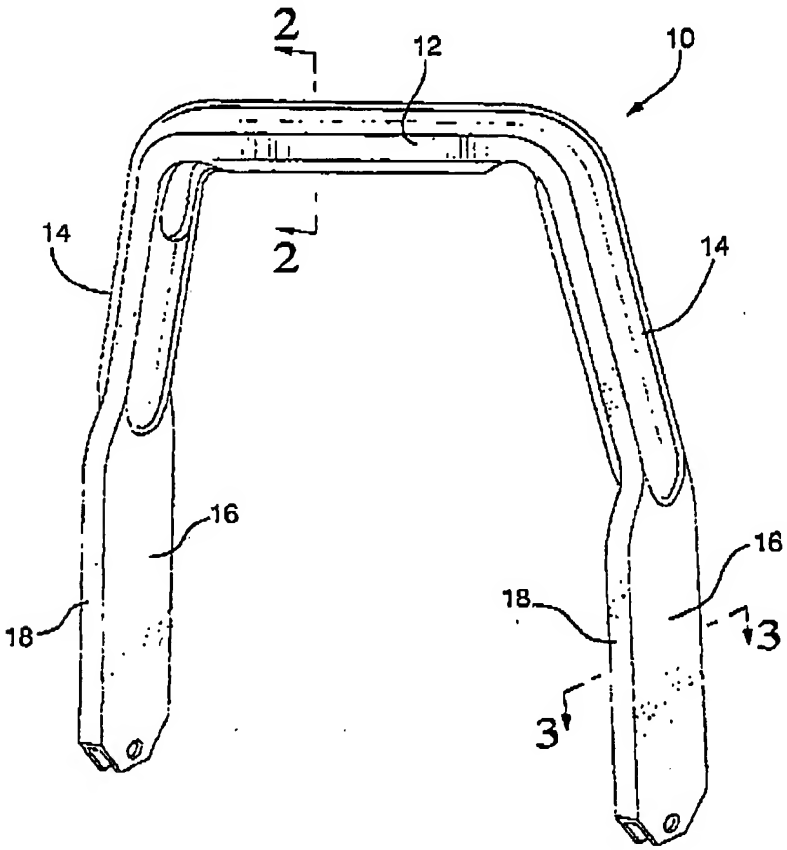
4,544,204	10/1985	Schmale	297/452.2
5,333,775	8/1994	Bruggemann et al.	228/157
5,338,100	8/1994	Rees	297/452.1
5,412,860	5/1995	Miyauchi et al.	29/897.2
5,557,961	9/1996	Ni et al.	72/61
5,567,017	10/1996	Bourgeois et al.	297/452.2

Primary Examiner—David P. Bryant
Attorney, Agent, or Firm—Patrick M. Griffin

[57] ABSTRACT

A method for producing a U shaped seat back frame from a single extruded blank. The blank's cross section is nearly circular, but with a pair of short, flattened off crests that create a pair of concentric arcs, in cross section. Over a length of each end of the blank, a rectangular cross section, solid mandrel is inserted between the crests and the arcs are flattened against the mandrel. The arcs are flattened into wider side walls, while the crests move apart, without deformation, to create narrower and stiffer walls of a rectangular cross section. Lastly, the U blank with flattened ends is bent into a U shape, creating an upper beam with a nearly circular cross section, and legs with truly flat and rectangular lower ends.

3 Claims, 3 Drawing Sheets



US005769499A

United States Patent [19]

Dudash et al.

[11] Patent Number: 5,769,499

[45] Date of Patent: Jun. 23, 1998

[54] MOTOR VEHICLE SEAT

[75] Inventors: Eugene S. Dudash, Wixom; Mark Stanisz, Waterford; Eric A. Smitterberg, Berkley; L. Keith Hensley, Farmington Hills; Sanford E. Cook, Belleville; Kevin J. Fudala, Dearborn Heights, all of Mich.

[73] Assignee: Lear Corporation, Southfield, Mich.

[21] Appl. No.: 660,523

[22] Filed: Jun. 7, 1996

[51] Int. Cl.[6] B60N 2/44

[52] U.S. Cl. 297/452.18; 297/391; 297/410

[58] Field of Search 397/452.18, 452.2, 397/215.11, 215.12, 216.1, 216.13, 216.14, 410, 391; 72/411; 29/417, 523, 897.35; D6/500, 501, 502; 403/242, 278

[56] References Cited

U.S. PATENT DOCUMENTS

2,458,095	1/1949	O'Conner	297/452.18
3,345,730	10/1967	Laverty	403/242
3,895,939	7/1975	Brooks et al.	75/124
4,522,443	6/1985	Van Blankenburg	297/452.18 X
4,544,204	10/1985	Schmala	297/452.18
4,844,545	7/1989	Ishii	297/410
4,923,250	5/1990	Hattori	297/410
4,976,493	12/1990	Frankila	297/410
5,393,488	2/1995	Rhodes et al.	420/95
5,401,072	3/1995	Parrand	297/216.14 X
5,522,640	6/1996	Bilezikjian	297/216.2
5,636,901	6/1997	Grillict et al.	297/452.18

FOREIGN PATENT DOCUMENTS

233822	8/1987	European Pat. Off.	297/452.18
4303032	10/1992	Japan	297/452.18

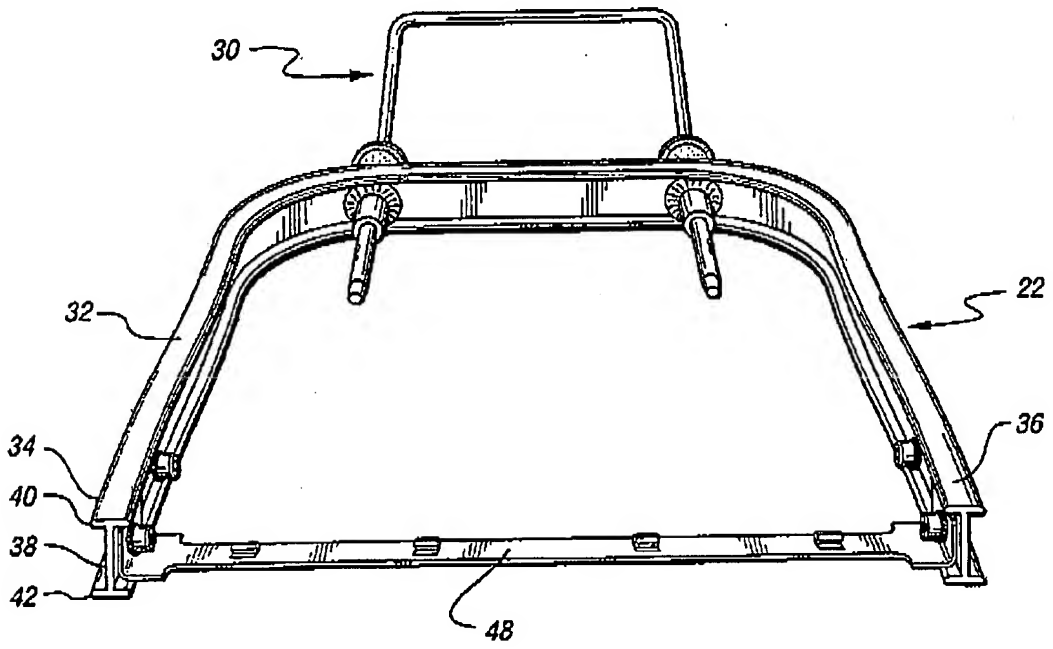
Primary Examiner—Peter R. Brown

Attorney, Agent, or Firm—Brooks & Kushman P.C.

[57] ABSTRACT

The present invention provides an apparatus for supporting a seat back in a vehicle comprising an aluminum I-beam formed in a generally U-shaped configuration, and having opposing ends supported with respect to the vehicle for forming a seat back frame. Also provided is a method of manufacturing a vehicle seat back frame, comprising: a) extruding an aluminum I-beam; b) curting the I-beam to a desired length; c) age-hardening the I-beam; and d) bending the I-beam into a substantially U-shaped configuration to form a vehicle seat back frame.

6 Claims, 5 Drawing Sheets



US005810446A

United States Patent [19]

Tadokoro

[11] Patent Number: 5,810,446

[45] Date of Patent: Sep. 22, 1998

[54] FRAME STRUCTURE OF SEATBACK

[75] Inventor: Takumi Tadokoro, Machida, Japan

[73] Assignee: Ikeda Bussan Co., Ltd., Ayase, Japan

[21] Appl. No.: 677,938

[22] Filed: Jul. 10, 1996

[30] Foreign Application Priority Data

Jul. 14, 1995 [JP] Japan 7-201334

[51] Int. Cl.[6] A47C 7/02

[52] U.S. Cl. 297/452.18; 297/452.2; 297/452.36

[58] Field of Search 297/452.18, 452.2, 297/452.31, 452.3, 452.34, 452.36; 138/121; 29/91, 91.1

[56] References Cited

U.S. PATENT DOCUMENTS

976,060	11/1910	Fulton	138/121
2,695,038	11/1954	Parce et al.	138/121
3,604,752	9/1971	Macknick	297/452.2
4,695,097	9/1987	Muraishi	297/452.2
5,129,707	7/1992	Yamauchi	297/452.18
5,131,721	7/1992	Okamoto	297/452.18
5,499,863	3/1996	Nakane et al.	297/452.18
5,509,716	4/1996	Kolena et al.	297/452.18

FOREIGN PATENT DOCUMENTS

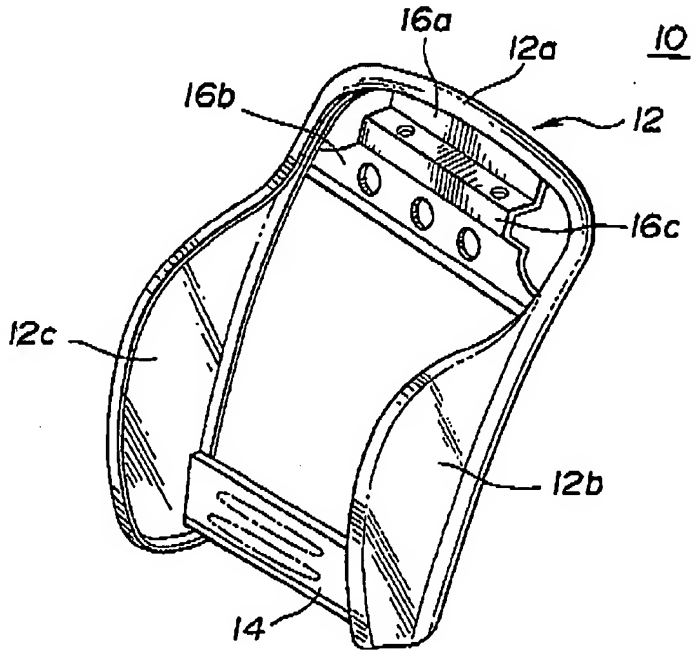
7031526 A1 2/1995 Japan .

Primary Examiner—Peter M. Cuomo
Assistant Examiner—Anthony D. Barfield
Attorney, Agent, or Firm—Foley & Lardner

[57] ABSTRACT

A reversed U-shaped base frame for a seatback frame structure is of a monoblock structure, which includes an upper horizontal tubular portion and two side vertical portions. The two side vertical portions extend downward from axially opposed ends of the upper horizontal tubular portion. The base frame is produced from a shaped metal sheet by pressing and curling the same in such a manner that a given portion of the shaped metal sheet, which is shaped to produce the upper horizontal tubular portion, is curled to have a substantially circular cross section. The feature of the invention is that the curled given portion has circumferentially opposed edges which are overlapped each other.

5 Claims, 3 Drawing Sheets



US006082823A

United States Patent [19]

Aumont et al.

[11] Patent Number: 6,082,823

[45] Date of Patent: Jul. 4, 2000

[54] BACKREST FRAMEWORK OF AN AUTOMOBILE VEHICLE SEAT

[75] Inventors: Jean-Claude Aumont, Etrechy; Patrick Daniel, Paris; Christophe Aufrere, Marcoussis, all of France

[73] Assignee: Betrand Faure Equipments S.A., Boulogne Cedex, France

[21] Appl. No.: 09/286,657

[22] Filed: Apr. 6, 1999

[30] Foreign Application Priority Data

Apr. 17, 1998 [FR] France 98 05058

[51] Int. Cl.[7] A47C 7/02; B60N 2/42

[52] U.S. Cl. 297/452.2; 297/452.18; 297/216.13; 297/483; 297/284.1

[58] Field of Search 297/452.2, 216.13, 297/483, 452.18, 284.1, 484

[56] References Cited

U.S. PATENT DOCUMENTS

4,040,660	8/1977	Barecki	297/216.13
4,626,028	12/1986	Hatsutta et al.	297/284.1 X
4,804,226	2/1989	Schmale	297/216.13
4,889,389	12/1989	White	297/483 X
5,058,953	10/1991	Takagi et al.	297/284.1 X
5,123,706	6/1992	Granzow et al.	297/452.18
5,246,271	9/1993	Boisset	297/483 X
5,253,924	10/1993	Glance	297/216.13 X
5,310,247	5/1994	Fujimori et al.	297/483 X
5,390,982	2/1995	Johnson et al.	297/483 X
5,447,360	9/1995	Hewko et al.	297/216.13 X
5,509,716	4/1996	Kolena et al.	297/216.13
5,516,195	5/1996	Canteleux	297/284.1
5,599,070	2/1997	Pham et al.	297/483
5,641,198	6/1997	Steffens, Jr.	297/483 X
5,645,316	7/1997	Aufrere et al.	297/216.13
5,658,048	8/1997	Nemoto	297/410
5,658,051	8/1997	Vega et al.	297/483
5,681,081	10/1997	Lindner et al.	297/216.13
5,697,670	12/1997	Husted et al.	297/216.13
5,772,280	6/1998	Massara	297/216.13 X
5,823,619	10/1998	Heilig et al.	297/216.13 X
5,823,627	10/1998	Viano et al.	297/216.13 X
5,836,648	11/1998	Karschin et al.	297/216.13 X
5,851,055	12/1998	Lewis	297/216.13 X
5,927,804	7/1999	Cuevas	297/216.13 X

FOREIGN PATENT DOCUMENTS

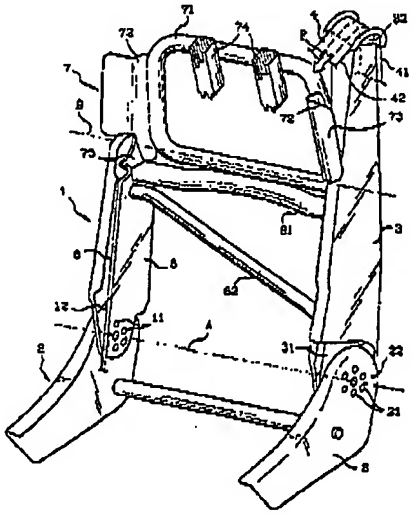
0 511 100	10/1992	European Pat. Off. .
0 661 190	7/1995	European Pat. Off. .
29 52 064	6/1981	Germany .
36 13 830	10/1987	Germany .
195 01 087	7/1996	Germany .
196 52 939	1/1998	Germany .
WO 97/30865	8/1997	WIPO .

Primary Examiner—Jose V. Chen
Assistant Examiner—Rodney B. White
Attorney, Agent, or Firm—Pollock, Vande Sande & Amernick

[57] ABSTRACT

A vehicle seat frame assembly includes two lateral upright side members and a brace connected between the upright side members to form a lower backrest frame. At least one of the upright side members has an upper end and it is rigid from a bottom of the lower backrest frame to the upper end, the upper end further including a point for attaching or passing a seat belt. An upper backrest frame is located above the lower backrest frame and is positioned below the upper end of the at least one upright side member. A hinge is provided for mounting the upper backrest frame at a lower edge thereof to the upright side members for allowing pivotal movement of the upper backrest frame relative to the lower backrest frame.

7 Claims, 3 Drawing Sheets



US006523893B2

(12) **United States Patent**
Kämper et al.

(10) **Patent No.: US 6,523,893 B2**
(45) **Date of Patent: Feb. 25, 2003**

(54) **VEHICLE SEAT FRAME**

(75) Inventors: **Ralf Kämper**, Heessen (DE); **Norbert Kielsmeier**, Oberntkirchen (DE)

(73) Assignee: **Faurecia Autositze GmbH & Co., KG** (DE)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: 09/846,594

(22) Filed: **May 1, 2001**

(65) **Prior Publication Data**

US 2001/0052724 A1 Dec. 20, 2001

(30) **Foreign Application Priority Data**

Jun. 15, 2000 (DE) 100 29 551

(51) **Int. Cl.**[7] **B60N 2/42**
(52) **U.S. Cl.** **297/216.13**
(58) **Field of Search** 297/216.13, 216.14, 297/452.2, 452.18, 452.4

(56) **References Cited**

U.S. PATENT DOCUMENTS

3,544,164 A * 12/1970 Ohta
4,192,545 A * 3/1980 Higuchi et al.
5,681,081 A * 10/1997 Lindner et al.

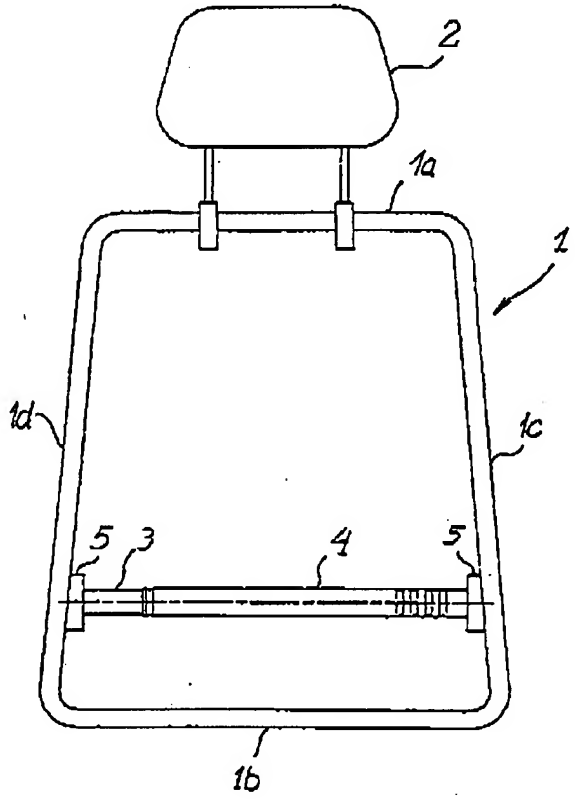
* cited by examiner

Primary Examiner—Milton Nelson, Jr.
(74) *Attorney, Agent, or Firm*—Bourque & Associates, P.A.

(57) **ABSTRACT**

A crosspiece for the frame of a vehicle seat that includes a supporting surface for the occupant. A crosspiece is formed as an element that shortens by a preset amount along its longitudinal dimension when a load is imposed up to a threshold value. The crosspiece includes an intentional bending point that bends perpendicular to the longitudinal direction when the threshold value is exceeded so that the crosspiece does not move in the direction of the supporting surface.

11 Claims, 6 Drawing Sheets



US006817672B2

(12) **United States Patent**
Matsunuma

(10) **Patent No.: US 6,817,672 B2**
(45) **Date of Patent: Nov. 16, 2004**

(54) **SEATBACK FRAME FOR VEHICLE SEAT**

(75) Inventor: **Noriyoshi Matsunuma**, Ayase (JP)

(73) Assignee: **Johnson Controls Automotive Systems Corporation** (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/097,236**

(22) Filed: **Mar. 13, 2002**

(65) **Prior Publication Data**

US 2002/0135222 A1 Sep. 26, 2002

(30) **Foreign Application Priority Data**

Mar. 23, 2001 (JP) 2001-085268

(51) **Int. Cl.**[7] **B60N 2/44**
(52) **U.S. Cl.** **297/452.18**; 297/483
(58) **Field of Search** 297/188.04, 217.1, 297/468, 483, 474, 482, 486, 452.18, 452.2

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,544,204	A *	10/1985	Schmale	297/452.18
5,310,247	A *	5/1994	Fujimori et al.	297/378.12
5,362,132	A *	11/1994	Griswold et al.	297/483
5,447,360	A *	9/1995	Hewko et al.	297/452.18
5,609,396	A *	3/1997	Loxton et al.	297/473
5,671,976	A *	9/1997	Fredrick	297/452.18
5,697,670	A *	12/1997	Husted et al.	297/216.13
5,711,577	A *	1/1998	Whalen	297/361.1
5,722,731	A *	3/1998	Chang	297/473
5,823,627	A *	10/1998	Viano et al.	297/471
5,909,926	A *	6/1999	Gonzalez	297/354.12
5,913,567	A	6/1999	Novak et al.	
5,918,943	A *	7/1999	Mitschelen et al.	297/452.18
5,971,490	A *	10/1999	Chang	297/473
5,984,419	A *	11/1999	Partington et al.	297/473
5,988,756	A *	11/1999	Aufrere et al.	297/452.18
6,027,171	A *	2/2000	Partington et al.	297/452.18
6,082,823	A *	7/2000	Aumont et al.	297/452.2

FOREIGN PATENT DOCUMENTS

EP	0590237	6/1994
EP	0709250	5/1996

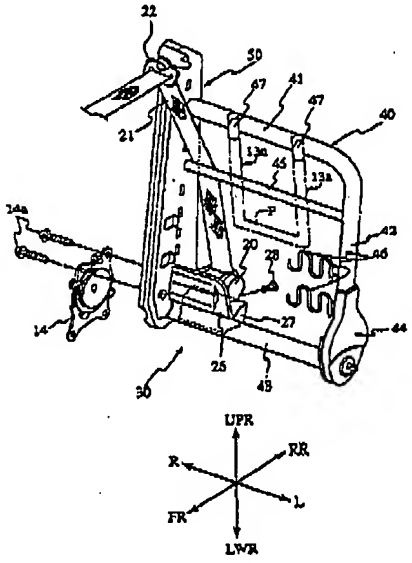
* cited by examiner

Primary Examiner—Peter M. Cuomo
Assistant Examiner—Stephen D'Adamo
(74) *Attorney, Agent, or Firm*—Foley & Lardner LLP

(57) **ABSTRACT**

In a seatback frame for a vehicle seat having a seatback and a seat cushion and equipped with a seat belt of a three-point type, a pipe frame formed along an external shape of the seatback and a vertically extending tower frame located in the seatback at the same side as a belt-through member of the seat belt of the three-point type and fixedly connected to the pipe frame are provided. The tower frame includes an outer side bracket, an inner side bracket, both of which are formed of vertically extending, elongated metal sheets each formed in a substantially C-shaped cross section and both of which are coupled to one another in abutting engagement with one another to form an internal space, and an intermediate brace member incorporated in the internal space to provide a reinforcement rib structure.

3 Claims, 5 Drawing Sheets



US007213887B2

(12) **United States Patent**
Dudash et al.

(10) **Patent No.: US 7,213,887 B2**
(45) **Date of Patent: May 8, 2007**

(54) **ATTACHMENT OF HEAD REST GUIDE TUBE TO VEHICLE SEAT FRAME**

(75) Inventors: **Eugene S. Dudash**, Wixom, MI (US); **Mark Staulsz**, Waterford, MI (US); **Eric A. Smitterberg**, Berkley, MI (US); **L. Keith Hensley**, Farmington Hills, MI (US); **Sanford E. Cook**, Belleville, MI (US); **Kevin J. Fudala**, Dearborn Heights, MI (US)

(73) Assignee: **Lear Corporation**, Southfield, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **10/904,938**

(22) Filed: **Dec. 6, 2004**

(65) **Prior Publication Data**

US 2005/0121955 A1 Jun. 9, 2005

Related U.S. Application Data

(62) Division of application No. 09/820,147, filed on Mar. 28, 2001, now Pat. No. 6,836,951, which is a division of application No. 09/014,875, filed on Jan. 28, 1998, now Pat. No. 6,223,436, which is a division of application No. 08/660,523, filed on Jun. 7, 1996, now Pat. No. 5,769,499.

(51) **Int. Cl.**
A47C 7/02 (2006.01)

(52) **U.S. Cl.** 297/452.18; 297/391; 297/404; 297/463.1; 297/410

(58) **Field of Classification Search** 297/404, 297/391, 452.18, 452.2, 410, 463.1, 463.2; 403/247, 372, 400, 388, 282; 256/22
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2,530,855	A *	11/1950	Bugg et al.	29/890.044
3,159,427	A *	12/1964	Lawson	297/410
3,286,539	A	11/1966	Loper et al.	
3,327,385	A *	6/1967	Shaver	29/512
3,345,730	A	10/1967	Laverty	
3,586,376	A *	6/1971	Mire	297/452.2
3,895,939	A	7/1975	Brooks et al.	
4,100,668	A	7/1978	Ruff et al.	
4,159,650	A *	7/1979	Maguire	73/847
4,423,905	A *	1/1984	Ray	297/391
4,519,650	A	5/1985	Terada et al.	
4,522,443	A	6/1985	Van Blankenburg	
4,544,204	A	10/1985	Schmale	
4,626,028	A *	12/1986	Harsutta et al.	297/289
4,631,797	A	12/1986	Hill	

(Continued)

FOREIGN PATENT DOCUMENTS

EP	0 233 822 A2	8/1987	

(Continued)

Primary Examiner—David R. Dunn
Assistant Examiner—Erika Garrett
(74) *Attorney, Agent, or Firm*—Brooks Kushman P.C.

(57) **ABSTRACT**

A vehicle seat assembly includes a seat back frame having an aperture extending therethrough, and a head rest guide tube disposed in the aperture. The guide tube has a radially extending swaged portion engaged with the seat back frame for securing the guide tube to the seat back frame.

30 Claims, 5 Drawing Sheets